

Title:                   HARD BOTTOM DYNAMICS IN THE FLORIDA KEYS:  
MONITORING AND TARGETED RESEARCH.

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Project Summary: Hard-bottom habitat covers approximately 40% of the seafloor in the shallow waters of the Florida Keys ecosystem, yet remarkably little is known about its structure or ecological function. There is no hard-bottom monitoring program in the Florida Keys as there is for other habitats (e.g., seagrass, coral reefs), yet there is concern about the possible impact of environmental change, disease, and resource exploitation on hard-bottom community structure and ecosystem function. In the last decade, hard-bottom communities in the Middle Keys were altered by mass mortalities of sponges and smaller, episodic sponge die-offs continue today. There are also questions about the potential impact of Everglades restoration and the commercial exploitation of sponges on hard-bottom. In addition, hard-bottom is the primary nursery habitat for spiny lobster, which sustain Florida's most valuable fishery. Potential changes in hard-bottom communities as well as our recent discovery of a lethal viral disease infecting juvenile lobster threaten the recruitment of lobster, but there is no monitoring plan in Florida for juvenile lobster or disease prevalence. Thus, these and other issues prompted an external science advisory panel for the EPA and Florida Keys National Marine Sanctuary (FKNMS) to conclude that the hard-bottom community has been neglected and its ecological significance must be explored.

For the past decade, our research group has conducted investigations of hard-bottom communities in the Florida Keys with an emphasis on lobster and sponge ecology. In the last few years we have used stable-isotope analysis to explore trophic structure in hard-bottom communities, investigated the potential impact of changing salinity on prominent hard-bottom fauna, and conducted surveys of the biodiversity and structure of shallow hard-bottom communities in the Florida Keys. With NOAA SFP funding, we are completing field studies and simulation modeling to understand commercial sponge population dynamics and to determine the impact of the commercial sponge fishery on sponge communities. We are thus well positioned to

address the dire need for hard-bottom monitoring and research and here propose to:

1. Follow up our large-scale survey of hard-bottom with the implementation of a monitoring program for the shallow hard-bottom communities of the Florida Keys suitable for assessing relationships and detecting changes in the density of sessile fauna and flora, fishes, and motile macroinvertebrates, as well as monitor the size structure, recruitment, and disease state of selected species.
2. Experimentally determine which processes (e.g., larval settlement, scouring, sedimentation, etc.) most influence the recruitment of prominent structure-forming hard-bottom species and thus the maintenance of hard-bottom habitat.
3. Experimentally evaluate the functional significance of the hard-bottom sponge community with respect to its impact on water column microbial abundance and diversity.

Relevance to  
Restoration and/or  
Resource  
Management:

This monitoring will permit quantitative documentation of potential changes in the structure of hard-bottom communities over time and in association with anthropogenic or natural events. Our plans to monitor the recruitment of juvenile lobster, commercial sponges, and key fin-fish resources in hard-bottom nursery habitat will provide, for the first time, the long-term and large-scale monitoring of post-settlement survival of recruits for these important fishery resources. Our manipulative experiments will yield new insight into the factors that contribute to the maintenance of hard-bottom communities (e.g., sedimentation, scouring, rates of settlement) and the functional significance of these communities in shaping water column planktonic communities.

Geographic Area:

Florida Keys.